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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/779,379	02/12/2004	Iwen Chao	110348-135995	8999
31817	7590	12/21/2005	EXAMINER	
SCHWABE, WILLIAMSON & WYATT PACWEST CENTER, SUITE 1900 1211 S.W. FIFTH AVE. PORTLAND, OR 97204			MAI, ANH D	
			ART UNIT	PAPER NUMBER
			2814	

DATE MAILED: 12/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/779,379

Applicant(s)

CHAO, IWEN

Examiner

Anh D. Mai

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 21 November 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) 16-30 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 and 31-34 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 February 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Status of the Claims***

1. Amendment filed November 21, 2005 has been entered. Claims 1 and 11 have been amended. Claims 31-34 have been added. Claims 1-34 are pending. Non-elected invention, claims 16-30 have been withdrawn.

### ***Drawings***

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "first type doping material having p type doping material" (as recited in claim 33) must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will

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be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

*Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 4-10, 13, 31, 32 and 34 are rejected under 35 U.S.C. 102(b) as being anticipated by Tomassetti (U.S. Patent No. 4,825,275).

With respect to claim 1, Tomassetti teaches an apparatus as claimed including:

a semiconductor device (98) formed on a conductivity region (96), the conductivity region (96) comprises a first type doping material having a first doping concentration; and

a low resistive path barrier (13) formed surrounding the conductivity region (96) to isolate the conductivity region (96) from a substrate (10) that supports the conductivity region (96) and the low resistive path barrier (13), the low resistive path barrier (96) comprises the first type doping material having a second doping concentration, wherein the second doping concentration ( $N^+$ ) is greater than the first doping concentration ( $N$ ). (See Figs. 3-4).

With respect to claim 4, the conductive region (96) of Tomassetti is at least one of n-type and p-type conductivity regions.

With respect to claim 5, the semiconductor device (98) of Tomassetti is a selected one of CMOS, BiCMOS, NMOS and PMOS.

With respect to claim 6, the low resistive path barrier (13) of Tomassetti is coupled to a power supply (78).

With respect to claim 7, the substrate (10) of Tomassetti is selected from one of p-type and n-type substrate.

With respect to claim 8, the low resistive path barrier (13) of Tomassetti comprises of a plug (32) coupled to a buried layer (13).

With respect to claim 9, the plug (32) of Tomassetti is coupled to a power supply (78).

With respect to claim 10, the low resistive path barrier (13) of Tomassetti comprises a selected one of N<sup>+</sup> and P<sup>+</sup> doped material.

With respect to claim 13, the low resistive path barrier (13) of Tomassetti comprises a first capacitive decoupling junction located at an interface between the low resistive path barrier (13) and the conductivity region (96), and a second capacitive decoupling junction located at an interface between the low resistive path barrier (13) and the substrate (10).

With respect to claim 31, the first type doping material of Tomassetti has a first doping concentration is an n type doping material, and the first type doping material having a second doping concentration is an n<sup>+</sup> type doping material.

With respect to claim 32, wherein the conductive region Of Tomassetti further comprises a second type doping material (24) having a third doping concentration (p), the second type doping material being a p type doping material, and the third doping concentration (p) being lesser than the second doping concentration (N<sup>+</sup>).

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With respect to claim 34, the second doping concentration ( $N^+$ ) of Tomassetti is about ten times that of the first doping concentration ( $N$ ). This is common knowledge in the art.

4. Claims 1-5, 7, 8, 10, 11, 13, 31 and 34 are rejected under 35 U.S.C. 102(b) as being anticipated by Ellul et al. (U.S. Patent No. 5,614,750) of record.

With respect to claim 1, Ellul teaches an apparatus as claimed including:

a semiconductor device (90) formed on a conductivity region (57), the conductivity region (57) comprises a first type doping material having a first doping concentration ( $n$ ); and a low resistive path barrier (55) formed surrounding the conductivity region (57) to isolate the conductivity region (57) from a substrate (52) that supports the conductivity region (57) and the low resistive path barrier (55), the low resistive path barrier (55) comprises the first type doping material having a second doping concentration ( $n^+$ ), wherein the second doping concentration ( $n^+$ ) is greater than the first doping concentration ( $n$ ). (See Figs. 6-7).

With respect to claim 2, the apparatus of Ellul further includes a deep trench isolation (68) formed surrounding the low resistive path barrier (55) on the opposite side of the conductivity region.

With respect to claim 3, the deep trench (68) of Ellul is extended into the substrate (52).

With respect to claim 4, the conductive region (57) of Ellul is at least one of n-type and p-type conductivity regions.

With respect to claim 5, the semiconductor device (90) of Ellul is a selected one of CMOS, BiCMOS, NMOS and PMOS.

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With respect to claim 7, the substrate (52) of Ellul is selected from one of p-type and n-type substrate.

With respect to claim 8, the low resistive path barrier (52) of Ellul comprises of a plug (82) coupled to a buried layer (55).

With respect to claim 10, the low resistive path barrier (55) of Ellul comprises a selected one of N+ and P+ doped material.

With respect to claim 11, the deep trench isolation (68) of Ellul comprises of a selected one of a dielectric and an insulation material.

With respect to claim 13, the low resistive path barrier (55) of Ellul comprises a first capacitive decoupling junction located at an interface between the low resistive path barrier (55) and the conductivity region (57), and a second capacitive decoupling junction located at an interface between the low resistive path barrier (55) and the substrate (52).

With respect to claim 31, the first type doping material of Ellul has a first doping concentration is an n type doping material, and the first type doping material having a second doping concentration is an n+ type doping material.

With respect to claim 34, the second doping concentration ( $n^+$ ) of Ellul is about ten times that of the first doping concentration ( $n$ ). This is common knowledge in the art.

5. Claims 1, 33 and 34 are rejected under 35 U.S.C. 102(b) as being anticipated by Lim et al. (U.S. Patent No. 6,225,674) of record.

With respect to claim 1, Lim teaches an apparatus as claimed including:

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a semiconductor device (15) formed on a conductivity region (14), the conductivity region (14) comprises a first type doping material having a first doping concentration (p); and a low resistive path barrier (12) formed surrounding the conductivity region (14) to isolate the conductivity region (14) from a substrate (11) that supports the conductivity region (14) and the low resistive path barrier (12), the low resistive path barrier (12) comprises the first type doping material having a second doping concentration ( $p^+$ ), wherein the second doping concentration ( $p^+$ ) is greater than the first doping concentration (p). (See Fig. 21).

With respect to claim 33, the first type doping material of Lim having a first doping concentration is a p type doping material, and the first type doping material having a second doping concentration is a  $p^+$  type doping material.

With respect to claim 34, the second doping concentration ( $p^+$ ) of Lim is about ten times that of the first doping concentration (p). This is common knowledge in the art.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.



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6. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tomassetti '275 as applied to claim 1 above, and further in view of Takeuchi et al. (U.S. Patent No. 5,939,755) of record.

Tomassetti is shown to teach all the features of the claim with the exception of explicitly disclosing the substrate is biased to 0 volts. Note that, the claimed biased to 0 volts does not appear to be critical since the Applicant has admitted that the substrate may be biased to the highest or lowest voltage.

However, Takeuchi teaches the substrate (11) may be biased to 0 volts (grounded). (See Figs. 2, 7, 9).

Note that the specification contains no disclosure of either the *critical nature of the claimed biased to 0 volts* of any unexpected results arising therefrom. Where patentability is aid to based upon particular chosen dimension or upon another variable recited in a claim, the Applicant must show that the chosen dimension are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to bias the substrate of Tomassetti to 0 volts (ground) as taught by Takeuchi to avoid latchup.

7. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tomassetti '275 or Ellul '750 as applied to claim 8 above, and further in view of Hoshi et al. (U.S. Patent No. 5,635,742) of record.

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Tomassetti and Ellul teach the apparatus as described in claim 8 above including: the low resistive path barrier (13) comprises a plug (32) coupled to buried layer (13), wherein both plug and barrier layer are heavily doped ( $N^+$ ). Note that the claimed resistivity do not appear to be critical.

Thus, Tomassetti and Ellul is shown to teach all the features of the claim with the exception of explicitly disclosing the dopant concentration, thus, the resistivity of the plug and barrier layer.

However, Hoshi teaches an apparatus having a low resistive path barrier (2/7) surrounding a conductivity region (4), wherein the low resistive path barrier (2/7) comprises a plug (7) coupled to a buried layer (2) having dopants concentration of  $5 \times 10^{17}$  to  $1 \times 10^{20} \text{ cm}^{-3}$  and  $5 \times 10^{17}$  to  $1 \times 10^{21} \text{ cm}^{-3}$ , respectively. (See Fig. 2, col. 4, lines 9-32).

Note that the specification contains no disclosure of either the *critical nature of the claimed resistivity of the plug and the buried layer* of any unexpected results arising therefrom. Where patentability is aid to based upon particular chosen dimension or upon another variable recited in a claim, the Applicant must show that the chosen dimension are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to form the plug and buried layer of Tomassetti or Ellul to have the dopant concentrations as taught by Hoshi to isolate conductive region from the substrate.

Note that, the resistivity are determined by the dopant concentration. Since the dopant concentration of Hoshi encompasses the dopant concentration of the instant plug and buried layer, thus, encompasses the claimed (resistivity) range.

8. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ellul '750 as applied to claim 2 above, and further in view of Desko et al. (U.S. Pub. No. 2003/0211701) of record.

Ellul teaches the apparatus as described in claim 2 above including deep trench isolation (68) extends into the substrate (52) and below the low resistive barrier (55).

Thus, Ellul are shown to teach all the features of the claim with the exception of explicitly disclosing the depth of the deep trench. Note that, the claimed depth of 5  $\mu\text{m}$  does not appear to be critical.

However, Desko teaches deep trench isolation (310) is formed into substrate (220) to a depth of 5  $\mu\text{m}$  to 8  $\mu\text{m}$ . (See Fig. 3).

Note that the specification contains no disclosure of either the *critical nature of the claimed depth of 5 $\mu\text{m}$*  of any unexpected results arising therefrom. Where patentability is aid to based upon particular chosen dimension or upon another variable recited in a claim, the Applicant must show that the chosen dimension are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to form the deep trench isolation of Ellul into the substrate to the depth as taught by Desko to isolate the apparatus from the adjacent devices.

*Response to Arguments*

9. Applicant's arguments with respect to amended claims have been considered but are moot in view of the new ground(s) of rejection.

*Conclusion*

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anh D. Mai whose telephone number is (571) 272-1710. The examiner can normally be reached on 8:00AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



**ANH D. MAI**  
**PRIMARY EXAMINER**